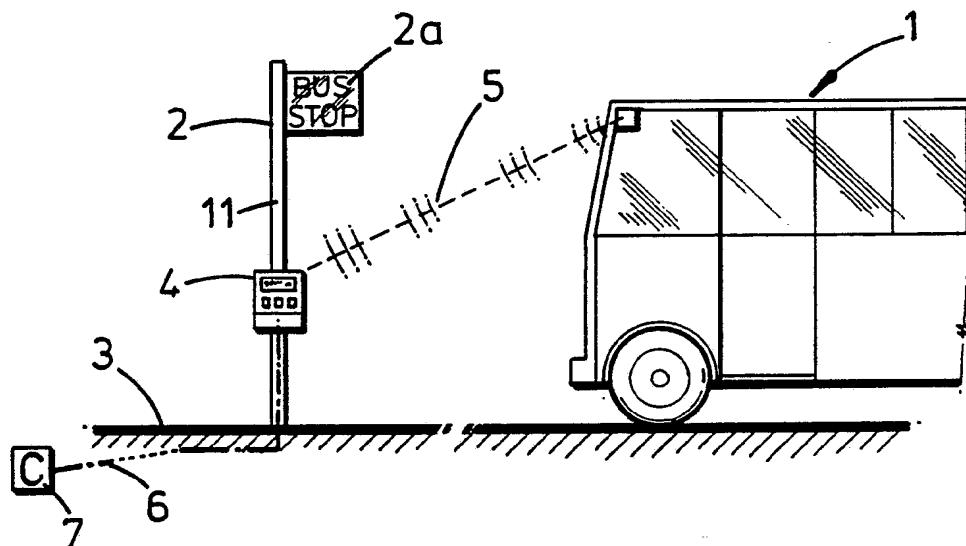


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b>  <b>G08G 1/123</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 93/13510</b>  <b>(43) International Publication Date:</b> 8 July 1993 (08.07.93)
<b>(21) International Application Number:</b> PCT/GB92/02377 <b>(22) International Filing Date:</b> 21 December 1992 (21.12.92)  <b>(30) Priority data:</b> 9127205.4 21 December 1991 (21.12.91) GB  <b>(71) Applicant (for all designated States except US):</b> J. MURDOCH WIGHT LIMITED [GB/GB]; Systems House, Pentland Industrial Estate, Loanhead, Midlothian EH20 9QH (GB).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> WILLIAMSON, Vernon, Macdonald [GB/GB]; Byways, Church Road, Lasswade, Midlothian EH18 1HB (GB). ANDERSON, Bruce, Surrey [GB/GB]; 8 Swanston Drive, Edinburgh EH10 7BL (GB).		<b>(74) Agents:</b> McCALLUM, William, Potter et al.; Cruikshank & Fairweather, 19 Royal Exchange Sq., Glasgow G1 3AE (GB).  <b>(81) Designated States:</b> AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** PASSENGER INFORMATION SYSTEM**(57) Abstract**

The present invention relates to a passenger information system for use at pick-up stations (2) along a transport vehicle route (3). The system comprises a plurality of intelligent terminals (4) at individual pick-up stations (2). Each terminal has data storage means (17) for storing timetable information relating to scheduled arrival times of vehicles (1), information display means (13) for displaying (18) at least one selected scheduled arrival time, and control means (19) having a clock means (22) and formed and arranged for controlling retrieval and display of said scheduled arrival time timetable information so as to display the next arrival time after the time reading of the clock means (22), for at least one route (3). In use of the system passengers waiting for the next transport vehicle (1) due at said pick-up point are provided with a display (18) of its scheduled arrival time. The terminals (4) are advantageously provided with sensor or signal means for use in recording vehicle arrival times and receiver/transmitter means for communicating information relating thereto with down-stream pick-up stations (2).

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PASSENGER INFORMATION SYSTEM

The present invention relates to passenger information systems and in particular to such systems and in particular to such systems suitable for use at pick-up stations.

- 5 Due to increasing traffic congestion there is an ever growing need for more efficient travel which generally involves public transport. A major practical disincentive to increased utilisation of this is the lack and/or difficulty of obtaining relevant information  
10 on expected arrival times so that the prospective passenger does not know how long he/she must wait before being picked up. Where conventional timetable displays are provided these normally have to carry timings for all times of day and night over a whole week (which  
15 often includes at least three different day schedules). As a result the timetables contain a large amount of information and many passengers find it difficult to extract the particular single item of arrival time information relevant to their own immediate  
20 requirement. The situation is aggravated (especially in the display area required) where a number of routes operate through a given pick-up point.

It is an object of the present invention to avoid or minimise one or more of the above disadvantages.

- 25 The present invention provides a passenger information system for use at a pick-up station on a transport vehicle route, which system comprises data storage means for storing timetable information relating to scheduled arrival times of vehicles at said pick-up station,  
30 information display means coupled to said data storage means for displaying at least one selected scheduled arrival time, and control means having a clock means and formed and arranged for controlling retrieval and display of said scheduled arrival time timetable  
35 information so as to display the next arrival time after

the time reading of the clock means, for at least one route, whereby in use of the system passengers waiting for the next transport vehicle due at said pick-up point are provided with a display of its scheduled arrival time.

Thus with a system of the present invention passengers are provided with the most appropriate information viz the expected arrival time of the next transport vehicle, in a particularly clear and easy to understand manner i.e. unencumbered with information on expected arrival times at other times of the day or week.

Given the exposed nature and relative vulnerability of equipment provided at more or less remote and/or often unattended pick-up points such as bus stops, to vandalism, it is normally highly desirable that the system should include a substantially weatherproof and secure housing. The housing may be a separate housing means for various components of the system, which separate housing is provided with secure mounting means for attachment to a suitable structure such as a bus shelter, bus stop pillar, street lamp-standard etc. Alternatively the housing could be constituted by part of such a structure, the system components being mounted inside a suitable cavity in the structure. The display means may conveniently be formed and arranged so as to also display route identification data in association with the expected arrival time, especially where more than one route operates at a given pick-up point. In such cases arrival times for different routes may be displayed simultaneously or alternated with each other. Alternatively or in addition, the system may be provided with a user operable input device e.g. key means or touch screen means, for user selection of the particular route for which arrival time information is to be provided.

Naturally various additional information may also be

presented on the display though desirably this should be limited in order to avoid interfering with principal objectives of clear and easily understandable timing information. Thus for example suitable advertising  
5 messages may be alternated or displayed simultaneously with the arrival time information. Also the data storage means may include listings of places, venues, and facilities served by the transport vehicle routes at that pick-up point and which may be called up by means  
10 of the user input device and searched through to obtain directly or, via further user input, information as to the route number serving the desired destination and/or the required alighting point. Similarly there may be held listing of goods and services provided by  
15 commercial establishments served by transport vehicles passing that pick-up point which may similarly be searched.

In addition, the system may also be provided with a ticket issuing device coupled to control means of the  
20 system, which control means is formed and arranged for displaying fare information through a said information display means, which system further includes a user operable input device for activating said control means so as to display fare information for a desired  
25 destination along a transport vehicle route serving said pick-up point, and at least one of a credit/debit card - and coin activated - ticket dispensing device. Various suitable ticket dispensing devices are already known and readily available, including devices which hold stocks  
30 of pre-printed tickets and those which print tickets immediately prior to issue. Where the system is used to provide additional information as identified hereinbefore there may also be provided a printing device (or possibly utilised a said ticket printing  
35 device) for printing out such information selected for display by a waiting passenger.

It will be appreciated that often public transport

vehicles do not run to time so that where a vehicle runs late the next actual arrival after a given scheduled arrival time will be considerably earlier than the subsequent scheduled arrival time so that a display suggesting that a given vehicle had already gone whereas in fact it had not yet arrived due to late-running, would be misleading. Conveniently therefore the system may be provided with sensor and/or signal receiving means for detecting the passage of a transport vehicle, and the control means is formed and arranged for modifying the retrieval and display of scheduled arrival time timetable information where the actual arrival time is delayed so that advance of the display to a subsequent scheduled arrival time is inhibited until the scheduled transport vehicle has actually passed. Conveniently the display of the original scheduled arrival time in such a case could simply be augmented by an additional message indicating that that particular service was now running late. If desired though the system could be provided with a remote communication link e.g. via land line, or suitable broadcast means (e.g. radio, microwave, infra-red, ultra-sonic etc. link depending on the distances and other circumstances involved) for communication with a central control unit and/or individual transport vehicles, for one or more of updating of timetable information, inputting special messages for display e.g. regarding emergency warnings, and modifying scheduled arrival time displays. Various suitable forms of data storage means may be employed including ROM and E<sup>2</sup>PROM chips. Conveniently though the data storage means comprises movable data storage media elements such as memory cards, floppy discs etc. and a suitable interface e.g. disc drive. Such an approach considerably facilitates any updating of the timetable information that may be required by simply inserting in the interface an element with the new data.

It will be understood that the present invention is suitable for use with a wide variety of transport

vehicle systems including buses, trams, light railways, conventional railways.

In a further aspect the present invention provides an intelligent transport vehicle pick-up station identifier device provided with a passenger information system of the present invention. Suitable identifier devices include pillars, post, standards and like structures, as well as shelters, which are provided with sign means indicating the pick-up station status of said identifier device.

Further preferred features and advantages of the invention will appear from the following detailed description given by way of example of a preferred embodiment illustrated with reference to the accompanying drawings in which:

Fig. 1 is a general view of a passenger information system of the present invention;

Fig. 2 is a detail view showing the principal parts of the apparatus in this system of Fig. 1; and

Fig. 3 is a schematic block diagram of the apparatus of Fig. 2.

Fig. 1 shows a bus 1 approaching a transport vehicle pick-up station identifier device in the form of bus stop 2 including a bus stop sign 2a, along a service route 3. The bus stop has mounted thereon a passenger information display unit 4 which is provided with a radio link 5 to the bus 1 and a land line communications link 6 to a remote central control 7.

As shown in Fig. 2 the display unit 4 comprises a strong metal or plastics housing 8 provided with a mounting means in the form of a clamping collar 9 with a nut and bolt means 10 for securing the unit 4 to the pillar 11 of the bus stop 2. The housing 8 has a window 12 of armoured glass or transparent plastics material through which is visible a visual display unit 13 such as a

back-lit LCD display or preferably an LED display for better readability.

Adjacent the display unit 13 is provided a user interface in the form of a plurality of keys 14 which can be operated by a waiting passenger to select particular information for display e.g. timings for routes other than that displayed and/or other information such as destination and other route details, timings of services at other times of day or week actual current time etc. It will also be appreciated that other forms of display for the scheduled arrival time could be employed if desired. Thus for example instead of displaying the arrival time as a time of day it could be displayed as a waiting time by using a processor formed and arranged for subtracting the current time from the next scheduled arrival time.

The housing 8 is also provided with a lockable access door 16 behind which is provided a disc drive 17 into which a floppy disc 18 with current timetable information can be inserted for updating the information stored in the system in a particularly simple and convenient manner.

Fig. 3 shows the principal operational components of the system which has a processor unit 19 (conveniently based on a commercially available one such as an 80286 Intel (Trade Mark) Microchip) provided with a power supply 20 and coupled to a high intensity LED display 21 of a suitable size e.g. 2 x 16 characters with each character in the form of a 5 x 7 LED Matrix. The processor 19 includes a clock means 22 for use in controlling the information to be displayed at any given time, and is coupled to data storage means in the form of RAM memory means 23 and the disc drive 17 into which can be inserted a floppy disc for providing up-to-date timetable information.

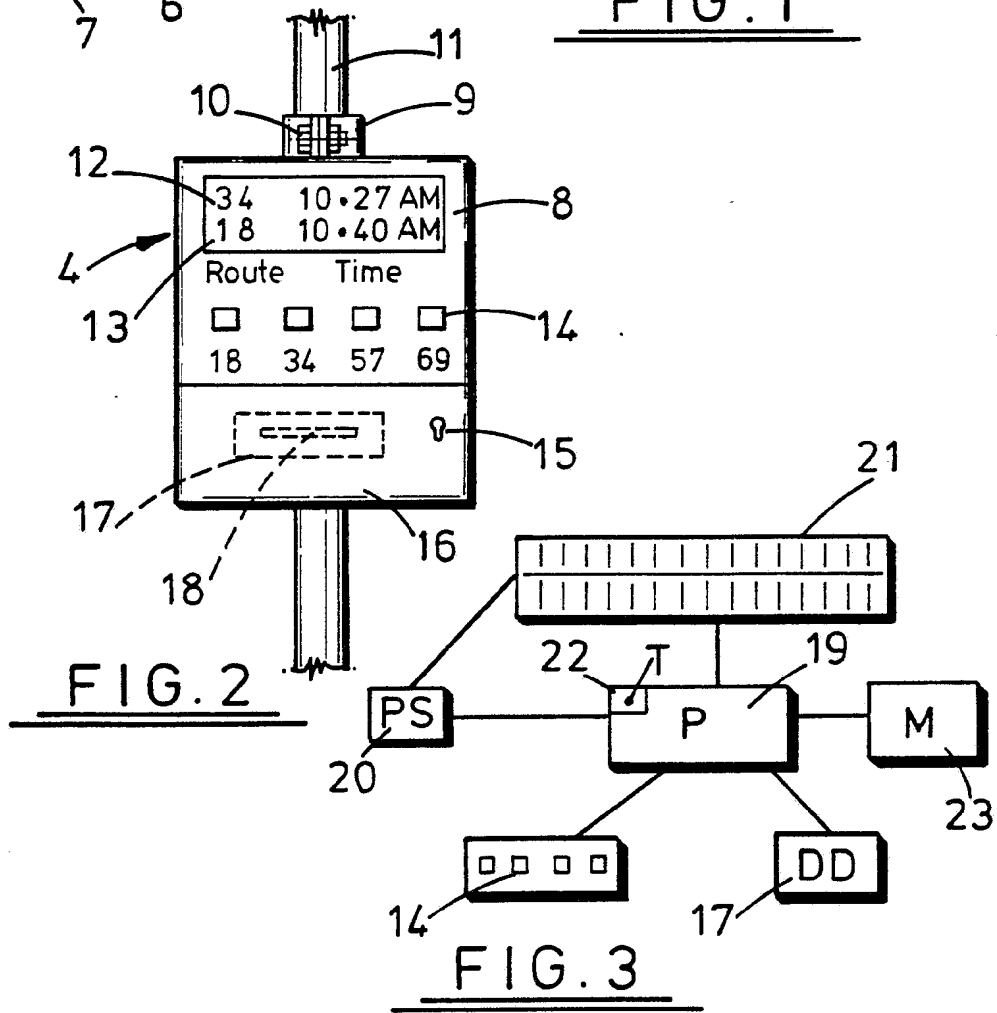
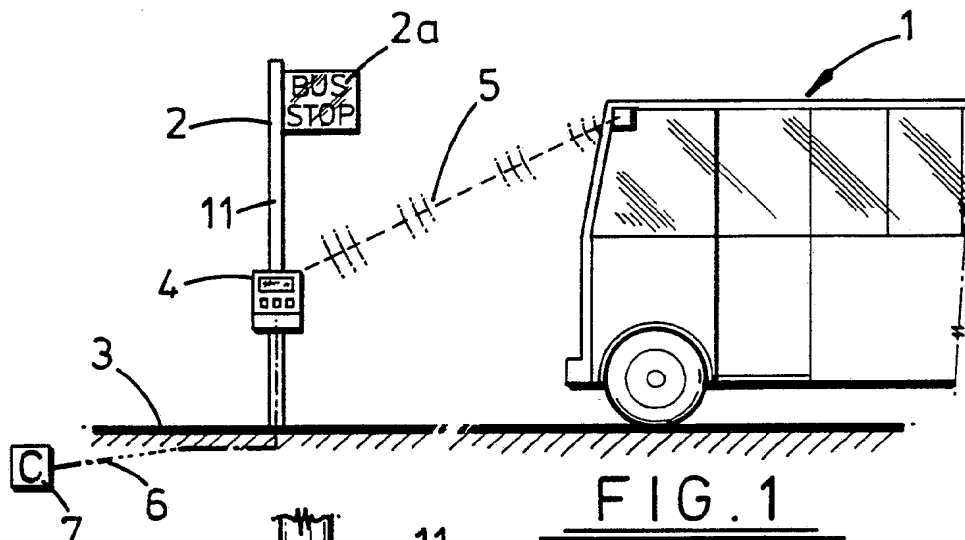


In use of the system a suitable program is loaded into the processor 19 for comparing the current time output from the clock means 22 with the timetable information held in the memory 23 and selecting the next later  
5 scheduled arrival time for a route corresponding to a default setting or the route last selected by a user by means of the appropriate key 14. Alternatively the program could be formed and arranged for cycling through all the routes at suitable intervals e.g. several  
10 seconds.

CLAIMS

1. A passenger information system for use at pick-up stations along a transport vehicle route, which system comprises a plurality of intelligent terminals disposable at individual pick-up stations, each said  
5 terminal having data storage means for storing timetable information relating to scheduled arrival times of vehicles at said pick-up station, information display means coupled to said data storage means for displaying at least one selected scheduled arrival time, and  
10 control means having a clock means and formed and arranged for controlling retrieval and display of said scheduled arrival time timetable information so as to display the next arrival time after the time reading of the clock means, for at least one route, whereby in use  
15 of the system passengers waiting for the next transport vehicle due at said pick-up point are provided with a display of its scheduled arrival time.
2. A system according to claim 1 wherein each said terminal means is provided with sensor and/or signal  
20 receiving means for detecting the passage of a transport vehicle and recording its approximate arrival time thereat, and receiver and transmitter means for communication with terminals at other pick-up stations along a transport route, for providing live updating  
25 information to downstream pick-up stations of the actual progress of the next transport vehicle due thereat, for modifying the predicted arrival time thereat by the control means thereat.
3. A system according to claim 2 wherein is used a  
30 microwave link signal receiving means for communicating with the transport vehicle.

4. A system according to claim 2 or claim 3 wherein are used VHF radio signal receiver and transmitter means for communication between said pick-up stations.
5. A system according to any one of claims 1 to 4  
5 wherein said intelligent terminal means are provided with user interface means for allowing passengers to interrogate said terminal means, for information stored therein.
6. A system according to claim 5 wherein said terminal  
10 means have information stored thereon relating to at least one of predicted arrival times for a plurality of different routes; and destinations served by a plurality of different routes.
7. A system according to claim 5 or claim 6 wherein  
15 said user interface means have user-operable input means selected from membrane switch means, keyboard means, pointer means, and touch-screen means.

1 / 1FIG. 3

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 92/02377

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: G08G 1/123

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: G08G, G09D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## CLAIMS, WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP, A1, 0451756 (COMPAGNIE GENERALE D'AUTOMATISME CGA-HBS SOCIETE ANONYME DITE), 16 October 1991 (16.10.91), column 2, line 3 - line 50, see the figure	1,5-7
Y	--	2-4
Y	FR, A1, 2336752 (GUILLLOT FRANCIS), 22 July 1977 (22.07.77), page 5, line 2 - line 20, figure 1	2-4
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

16 March 1993

Date of mailing of the international search report

01.04.93

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Patent Abstracts of Japan, Vol 14, No 44, P-996, abstract of JP, A, 1-276299 (NEC CORP.), 6 November 1989 (06.11.89)	1
A	--	2,3
X	US, A, 4092718 (HANS J. WENDT), 30 May 1978 (30.05.78), column 3, line 25 - line 47, figure 2	1,5-7
A	--	
A	FR, A1, 2556864 (A. GARBARINI S.A.), 21 June 1985 (21.06.85), page 7, line 1 - line 29, figure 2	1
A	--	
A	EP, A2, 0219859 (MITSUBISHI DENKI KABUSHIKI KAISHA), 29 April 1987 (29.04.87), column 13, line 54 - column 14, line 57, figures 12-15	1
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

26/02/93

International application No.

PCT/GB 92/02377

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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FR-A1- 2336752	22/07/77	BE-A- 843859	03/11/76
		CA-A- 1058298	10/07/79
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